ELSEVIER Original Article

Obstructive Colitis Proximal to Obstructive Colorectal Carcinoma

Hye Kyung Chang,[1] Byung Soh Min,[1] Yong Taek Ko,[1] Nam Kyu Kim,[1] Hogeun Kim,[2] Haeryoung Kim[2] and Chang Hwan Cho,[1] Departments of [1]Surgery and [2]Pathology, College of Medicine Yonsei University, Seoul, Korea.

The term "obstructive colitis" refers to ulceroinflammatory lesions occurring in the colon proximal to a completely or partially obstructing lesion. It has been referred to by various terms in the literature. This entity differs from the carcinoma of the colon that complicates true ulcerative colitis where there is involvement distal to the neoplasm as well as proximal to it. Although it has appeared in the literature over several decades, it remains an uncommon and troublesome disease. In Yonsei University Medical Center, for 11 years from January 1996 to December 2006 we encountered seven patients with obstructing colorectal carcinoma complicated by obstructive colitis. Here we report our cases to share our experience and to review the literature to facilitate the recognition and proper management of this rare disease entity. [*Asian J Surg* 2009;32(1):26–32]

Key Words: colitis, colorectal neoplasms, intestinal obstruction, ischaemia

Introduction

Obstructive colitis has appeared in the literature over several decades.[1–12] The term "obstructive colitis" refers to ulceroinflammatory lesions occurring in the colon proximal to a completely or partially obstructing lesion. It has been referred to by various terms in the literature, such as "acute necrotising colitis",[1] "obstructive colitis",[2] "ischaemic colitis",[3] "acute gangrenous colitis",[4] "pseudomembranous colitis",[5] or simply as "ulcerative disease of the colon", "acute colitis secondary to obstruction"[6] or "nonspecific colitis".[7] This differs from the carcinoma of the colon that complicates true ulcerative colitis, with which there is involvement distal to the neoplasm as well as proximal to it.

The incidence of obstructive colitis is known to be 0.3–7% of all colorectal cancer.[8,9,13] Although obstructive colitis has been published in the literature for several decades, it remains an uncommon and troublesome disease.[12]

The purpose of this report is to mention some cases of obstructive colitis accompanied by colon cancer and review the literature to facilitate its recognition and proper management.

Patients and methods

For 11 years from January 1996 to December 2006, we had found seven patients of obstructive colitis associated with colorectal cancer in a retrospective study of registered data at Yonsei University Medical Center. The diagnostic criteria of obstructive colitis accompanied by colorectal cancer included the confirmation of ulceroinflammatory lesions occurring in the colon proximal to a completely or partially obstructing colorectal cancer and the absence of chronic inflammatory bowel disease. History, clinical characteristics, operative findings, pathologic findings, and duration of survival in the seven cases were reviewed from the medical records retrospectively.

Address correspondence and reprint requests to Dr Nam Kyu Kim, Department of Surgery, Yonsei University College of Medicine, 250 Seongsanno Seodaemun-Gu, 120-752 Seoul, Korea.
E-mail: namkyuk@yuhs.ac • Date of acceptance: 25 June 2008

Results

Clinical findings of the seven patients pathologically diagnosed as obstructive colitis proximal to obstructive colorectal cancer are summarised in the Table. The patients ranged in age from 51 to 81 years (mean, 70.1 years). Six cases were male and one was female. All patients except one had hypertension, diabetes mellitus, or other prior chronic illness. They showed obstructive symptoms such as abdominal pain, abdominal distension, constipation or vomiting in all cases, and fever in two cases. The radiologic findings of the abdominal computed tomography (CT) of the six cases were compatible with colon or rectal cancer and distention of the proximal bowel without ischaemic change (Figure 1A and B). There was only one case where proximal colonic ischaemia was diagnosed with abdominal CT prior to surgery (Figure 1C and D).

In one case of sigmoid colon cancer, a colonoscopic stent insertion was attempted for preoperative decompression of colonic obstruction. After the stent insertion, the obstructive symptoms were relieved and 8 days after the colonoscopic stent insertion, a total colectomy with ileorectal anastomosis was performed.

The extent of resection was decided at the time of operation. After the exploration of the abdominal cavity, the surgeon examined the status of the colon proximal to the lesion to determine whether there were any inflammatory changes such as thickening and stiffness of the colon wall and colour changes. After the resection of colon, the condition of mucosa at the proximal margin and the proximal

Table. Clinical characteristics in the seven cases of obstructive colitis with colorectal cancer

Case	Gender/ age	Tumour	Ischaemic length (cm)	Preoperative treatment for obstruction	Preoperative carcinoembryonic antigen (CEA, ng/mL)	Name of operation
1	M/51	Descending colon Adenosquamous carcinoma moderate differentiated	45	None	–	Subtotal colectomy Ileodescending colostomy
2	M/80	Sigmoid colon Adenocarcinoma moderate differentiated	13	None	1.58	Low anterior resection
3	M/60	Ascending colon Adenocarcinoma moderate differentiated	24	None	–	Right hemicolectomy Segmental resection of distal ileum Ileotransverse colostomy (end-to-end anastomosis)
4	M/74	Rectum Adenocarcinoma moderate differentiated	100	None	–	Total colectomy End ileostomy
5	F/81	Descending colon Adenocarcinoma moderate differentiated	33	Colonoscopic stent insertion	1.56	Total colectomy Ileorectal anastomosis
6	M/75	Sigmoid colon Adenocarcinoma moderate differentiated	1	None	2.18	Anterior resection
7	M/40	Sigmoid colon Mucinous adenocarcinoma	74	None	1.26	Subtotal colectomy Ileorectal anastomosis

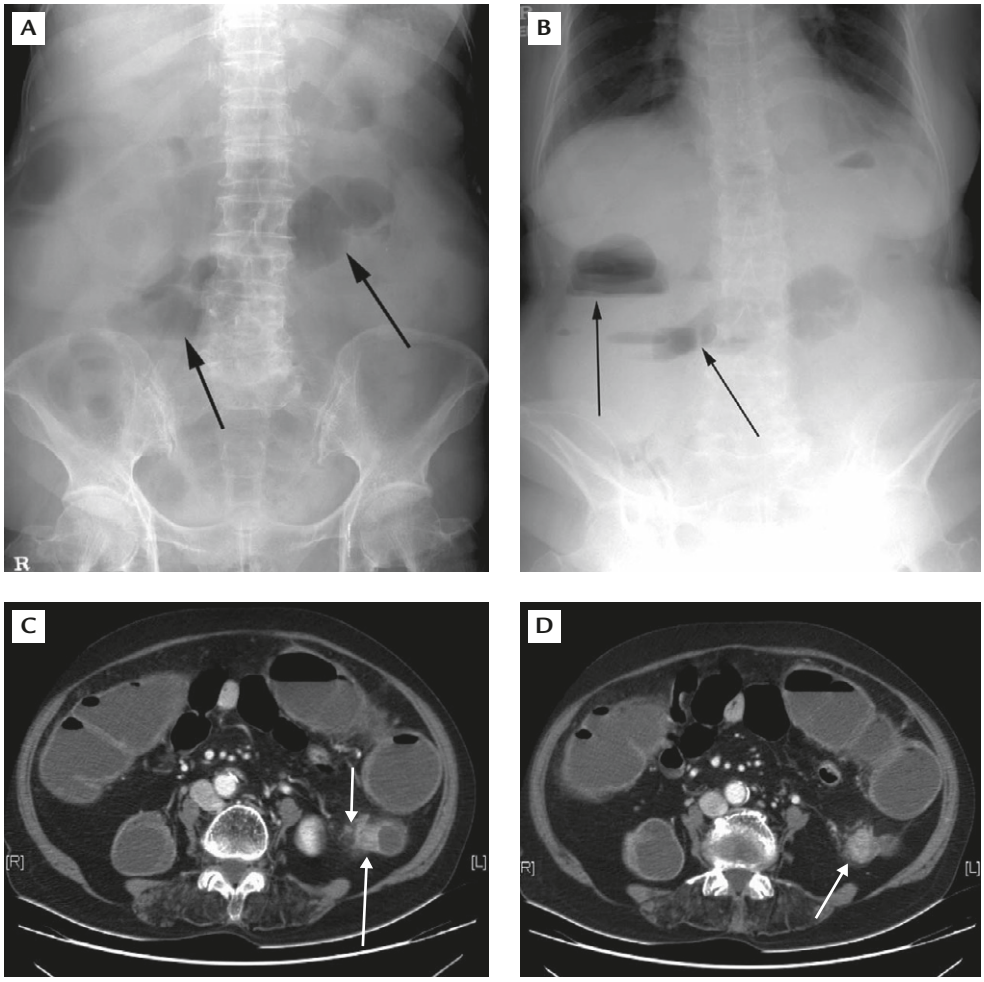

Figure 1. Simple abdominal X-ray, flat (A) and upright (B) view of descending colon cancer patient. Focal gas distension in small bowel and air-fluid level suggest intestinal obstruction (black arrows). Abdominal pelvic CT of descending colon cancer patient. Pericolic fat infiltration and regional lymph nodes are noted (C). There is a short segment stricture with a bulging mass in the descending colon (D). The proximal colon and terminal ileum are dilated.

remnant bowel was checked before performing anastomosis (Figure 2A and B). If there were ischaemic changes of the proximal remnant bowel mucosa, more proximal colon was resected to the extent that healthy mucosal margin was obtained (Figure 2C and D).

Total and subtotal colectomies were performed in three cases: two descending colon cancers and a sigmoid colon cancer. For the two cases of sigmoid colon cancers, anterior resections were performed. In the patient with ascending colon cancer, an ischaemic lesion was noted in the proximal limb (distal ileum) after right hemicolectomy. After further segmental resection of the distal ileum, an ileotransverse colostomy performed in an end-to-end fashion became possible. In a case of rectal cancer, a total proctocolectomy with end ileostomy was carried out.

The pathologic examination revealed five cases of moderately differentiated adenocarcinoma, a case of adenosquamous carcinoma in the descending colon and a case of mucinous adenocarcinoma in the sigmoid colon. Five patients had stage II colon cancers, one had stage III rectal cancer and one had stage IV sigmoid colon cancer with metastatic peritoneal seeding nodules. The ischaemic colitis-involved area was usually mildly dilated; it exhibited moderate thickening of the wall and had a granular luminal surface accentuated in areas by deeper longitudinal or transverse ulcers. Ischaemic colitis or ischaemic ileitis was found as multiple, various sized, nodular appearance with diffusely intervening ulceration, multifocal petechiae, oedema, necrosis, and inflammation in the proximal mucosa (Figure 3A–D).

The mean length of the ischaemic colitis was 43 cm. The length of the ischaemic change of the resected bowel was ranged from 13 cm in the case of sigmoid colon cancer where the ischaemic lesion was noted in the upper resection

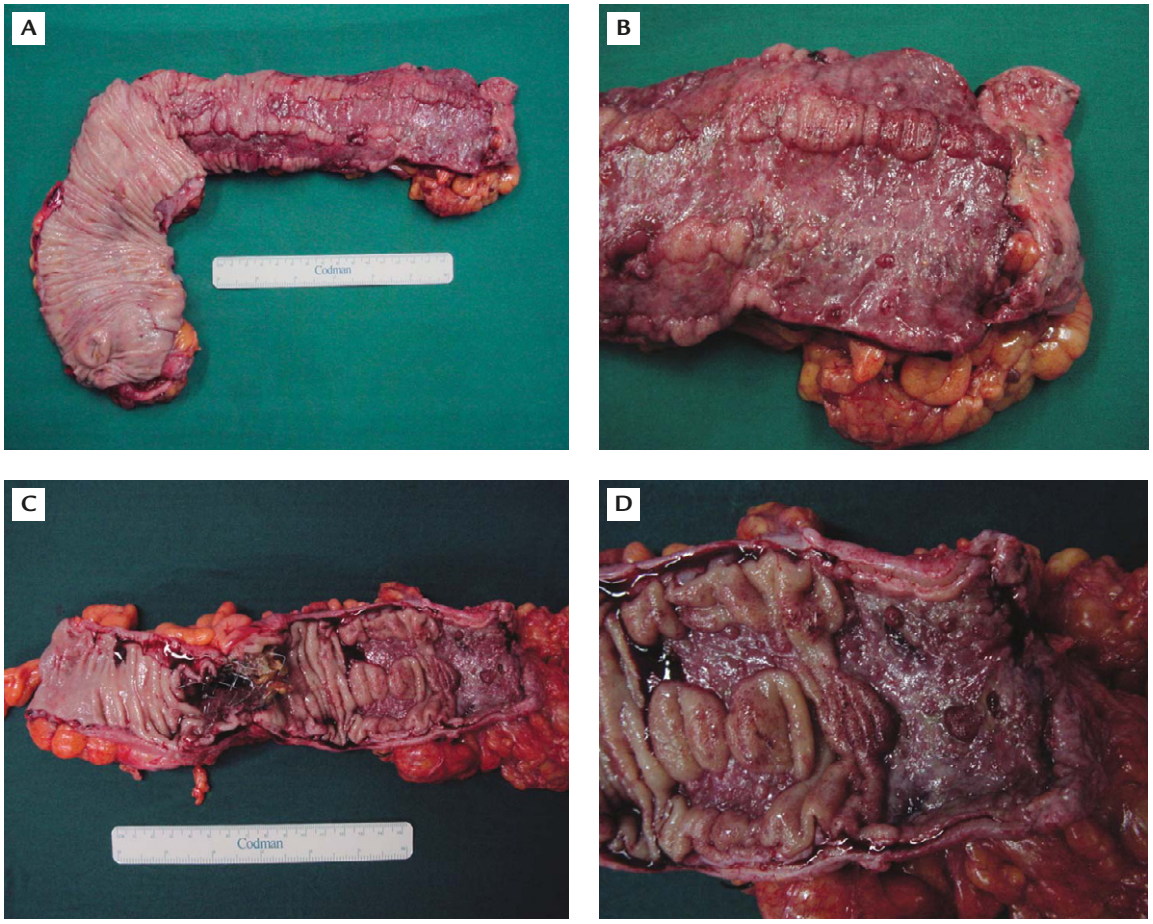

Figure 2. (A, B) The ascending and transverse colon of the transverse colon cancer in a patient. The mucosal surface of the transverse colon shows a relatively well-defined linear longitudinal ulcer which extends to the distal resection margin. (C, D) The descending colon of the descending colon cancer. The ill-defined linear longitudinal shallow ulceration and ill-defined ulcerative lesion extend to the proximal resection margin. The metallic stent of the obstructive lesion which was inserted preoperatively is noted in the left figure. The ruler is 15 cm long.

margin, to 100 cm in which almost the whole colon except the caecum was changed by ischaemia due to an obstructing rectal cancer. The whole length of the bowel with obstructive colitis was resected, so that anastomosis could be performed on the area proximal to the ischaemic lesion in all cases, except the one case of sigmoid colon cancer which showed the ischaemic changes in the upper margin of anastomosis.

Focal ulceroinflammatory changes of mucosa were noted in the terminal ileum in two patients: one had ascending colon cancer and the other had sigmoid colon cancer. Both lesions caused severe obstruction.

The postoperative complication was absent except the one case of the sigmoid colon cancer where the ischaemic lesion was involved in the anastomosis. The only complication was a postoperative obstruction, not a leakage.

Four patients had completed adjuvant chemotherapy. During the follow-up period, no recurrence was noted. In one patient who had had ascending colon cancer, hepatocellular carcinoma in the right lobe, was detected during the follow-up of 4.5 years after the primary operation, so right lobectomy of the liver was performed. One 80-year-old male patient was followed up merely for 6 months after the operation of low anterior resection. He had been free of disease for 6 months, but there was no available data about his survival or recurrence.

Discussion

Obstructive colitis is encountered in 0.3–7% of all colorectal cancer and affects both men and women over 50 years of age. The left side of the colon, especially the sigmoid colon, is usually involved in obstructive colitis, which may attribute for the high incidence of sigmoid colon cancer.[8,13]

There are diverse opinions concerning the incidence of obstructive colitis. Rutledge reported that about one percent

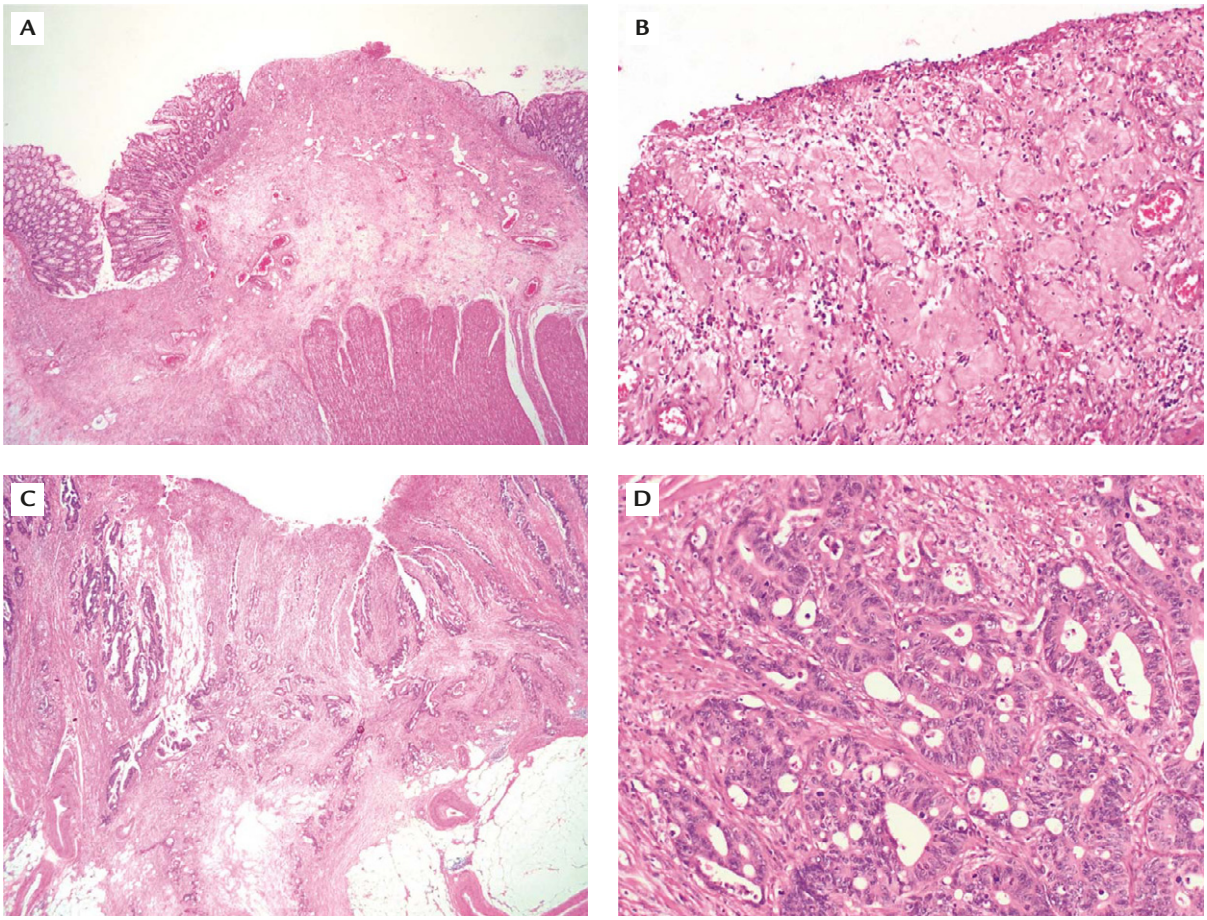

Figure 3. (A, B) Microscopic findings of obstructive colitis (haematoxylin & eosin, 100×) and (C, D) colon cancer (haematoxylin & eosin, 100×).

of colon cancer cases developed proximal colitis.[10] Glotzer et al reported only six cases of colitis among 1,886 cases of colon cancer over 12 years.[11] Toner et al reported the incidence of obstructive colitis as 7%.[9] The infrequent occurrence of obstructive colitis secondary to colon cancer is also supported by the small number of reported cases.[6] But obstructive colitis may be considerably more frequent than is currently accepted because it may be difficult to recognise at the time of surgery.[9]

Patients have no past history of colitis, and have shown no subsequently developed ulcerative colitis in the remaining bowel after operation during the follow-up periods. The clinical symptoms are abdominal pain, constipation or watery diarrhoea, haematochezia, nausea and vomiting, which are mainly produced by the obstructive colon cancer. They frequently show fever and abdominal tenderness.[6]

The gross finding of obstructive colitis is large, irregular ulceration with mucosa covered by a haemorrhagic and purulent exudate. The ulcers are commonly linear and longitudinally oriented. The margins of the ulcers are frequently sharply defined with intact intervening mucosa. The islands of mucosa between the ulcerations are edematous and congested. Pseudopolyps are infrequently observed. The wall of the diseased colon is usually thickened, stiff and friable.[1] The mucosa of the colon distal to the neoplasm is normal both grossly and microscopically. Frequently, 2–6 cm immediately proximal to the carcinoma is free of ulceration and inflammation. The rest of the proximal colon will have varying degrees of inflammation and ulceration. This differs from the carcinoma of the colon that complicates true ulcerative colitis, with which there is involvement distal to the neoplasm as well as proximal to it.[3,6]

Microscopically, the lesions were composed of granulation tissue with a mixed acute and chronic inflammatory infiltrate that replaced the mucosa and often the submucosa. Sometimes this extended into the muscularis propria, with associated peritonitis and perforation. Histopathologically, obstructive colitis is similar to ischaemic colitis, being characterised by either an erosion or a shallow

ulcer confined to the mucosa or submucosa.[14] The most common microscopic findings of obstructive colitis are necrosis of the mucosa with denudation of epithelial cells, haemorrhage, congestion, and prominent neutrophilic infiltration.

An ischaemic origin is probably mainly due to hypoperfusion following raised intramural pressure, stretching and spasm.[2] A synergic effect of infection and ischaemia has also been suggested. Altered faecal flora may have a direct or indirect role in the development of obstructive colitis.[9] When intraluminal pressure exceeds 35 cmH_2O for several hours, insufficient mural circulation usually leads to ischaemic damage.[15] The necrotic area was produced in the colon with a sustained intraluminal pressure of 40 cmH_2O.[13] The colonic obstructions secondary to malignancy have sustained pressures above that level, thus having sufficient intraluminal pressure to reduce mucosal circulation and cause such lesions. However, there was no correlation between the severity of the inflammation and the extent of obstruction or distention of the bowel.[1,2]

Initially, ischaemic damage of distended colonic walls affects predominantly the mucosal and submucosal layers which are most sensitive to hypoxia. The serosa and muscular walls better resist any diminution in perfusion and are likely to preserve a normal aspect even when the mucosal and submucosal layers have already been markedly altered. Therefore, even severe ischaemic lesions may occasionally be difficult to notice in the course of laparotomy.[13]

If the obstructive colitis had been overlooked and an anastomosis had been made through the involved segment of colon, the complication rate might rise to 25% with significant morbidity and mortality.[3,6] Complications include peritonitis, perforation, bleeding of the remained ulcerative lesion and breakdown of anastomoses made through involved segments of colon that may appear externally normal at surgery. Therefore, it is important to open the resected bowel in the operative field, and inspect the mucosal surface of the dilated and thickened bowel to exclude any inflammatory or ischaemic process secondary to obstruction in the area of the anastomosis. This may ensure subsequent safe anastomosis and prevent leakage at the anastomosis or stricture formation. If the ulceration is noted, a frozen section examination of the proximal margin of the resected bowel should be done to determine the viability of remaining tissues, and an extension of the bowel resection must be considered. If extension of the operation seems unfavourable because of the poor condition of the patient, or the extent of the colitis, an exteriorisation of both limbs (double-barrel colostomy) or an anastomosis with a diverting proximal loop colostomy to prevent the anastomotic failure can be performed following the expected clearing of the inflammation. If a colostomy has been performed, the re-establishment of continuity should be delayed for 4 to 6 weeks.[13] Also the colonic loops should be examined by a sigmoidoscope and a barium enema before the closure of the colostomy is intended.[1]

Inflammatory bowel changes involved in the obstructive colorectal cancer are difficult to detect preoperatively. They are often found incidentally by surgeons, or by pathologists upon examination of the gross specimen. Therefore, obstructive colitis should always be kept in mind during surgery of obstructive colorectal cancer. The surgeon must examine the removed colonic segment so they do not leave associated lesions and they do exclude an ischaemic process in the area of the anastomosis, so as to prevent serious postoperative complications. The radiologist should be alert to the association of ischaemic damage proximal to an obstructive colorectal cancer.

In conclusion, obstructive colitis associated with colorectal cancer is a lesion confined to the mucosa or submucosa. It is difficult to identify obstructive colitis during the laparotomy as the serosal surface of the colon may be normal finding. The surgeon must be fully aware that disastrous complications may happen if an anastomosis is made through the involved bowel, and the resected specimen should be opened and examined so as not to leave the obstructive colitic lesion in the proximal limb. If any suspicious lesion is noted, further resection of the bowel or exteriorisation of both limbs must be considered. Thereby the serious complications such as leakage at the anastomosis or stricture formation can be prevented.

Acknowledgements

This study was supported by a grant from the Korean Health 21 R&D Project, Ministry of Health & Welfare, Republic of Korea (0405-BC01-0604-00002).

References

1. Hurwitz A, Khafif RA. Acute necrotizing colitis proximal to obstructing neoplasms of the colon. *Surg Gynecol Obstet* 1960; 111:749–53.

2. Glotzer DJ, Pihl BG. Experimental obstructive colitis. *Arch Surg* 1966;92:1–8.
3. Ganchrow MI, Clark JF, Benjamin HG. Ischemic colitis proximal to obstructing carcinoma of the colon. *Dis Colon Rectum* 1970;14:38–42.
4. Harada T, Umezawa L, Mogami K, Itoh Z. Acute gangrenous colitis proximal to obstructive cancer of the sigmoid colon. *Jpn J Surg* 1975;5:39–47.
5. Goulston SJ, McGovern VJ. Pseudomembranous colitis. *Gut* 1965;6:207–12.
6. Feldman PS. Ulcerative disease of the colon proximal to partially obstructive lesions. *Dis Colon Rectum* 1975;18:601–12.
7. Tietjen GW, Markowitz AM. Colitis proximal to obstructing colonic carcinoma. *Arch Surg* 1975;110:1133–8.
8. Reeders JW, Rosenbusch G, Tytgat GN. Ischemic colitis associated with carcinoma of the colon. *Eur J Radiol* 1982;2:41–7.
9. Toner M, Condell D, O'Briain DS. Obstructive colitis. Ulceroinflammatory lesions occurring proximal to colonic obstruction. *Am J Surg Pathol* 1990;14:719–28.
10. Rutledge RH. Pseudo-ulcerative colitis proximal to obstructing colon carcinoma. *Am Surg* 1969;35:384–8.
11. Glotzer DJ, Roth SI, Welch CE. Colonic ulceration proximal to obstructing carcinoma. *Surgery* 1964;56:950–6.
12. Tsai MH, Yang YC, Leu FJ. Obstructive colitis proximal to partially obstructive colonic carcinoma: a case report and review of the literature. *Int J Colorectal Dis* 2004;19:268–72.
13. Saegesser F, Sandblom P. Ischemic lesions of the distended colon. A complication of obstructive colorectal cancer. *Am J Surg* 1975;129:309–15.
14. Iwashita A, Kuroiwa S, Enjoji M, Watanabe H. Pathologic study of ischemic colitis and obstructive colitis. *J Jpn Soc Coloproctol* 1981;34:599–616.
15. Boley SJ, Girdhar PA. Pathophysiologic effects of bowel distension on intestinal blood flow. *Am J Surg* 1969;117:228–34.
16. Wangensteen OH. *Intestinal obstructions: physiological, pathological and clinical considerations with emphasis on therapy, including description of operative procedures*, 3rd edition. Springfield, Charles C Thomas, 1955:33–48.